As=the maximum sail area in square meters (square feet).
Hc=the height of the center of effort of the sail area above the deck, in meters (feet).
W=the total displacement of the vessel, in kilograms (pounds).
X=7.32 kilograms/square meter (1.5 pounds/square foot).

[CGD 79–023, 48 FR 51017, Nov. 4, 1983, as amended by CGD 83–005, 51 FR 924, Jan. 9, 1986; CGD 85–080, 61 FR 944, Jan. 10, 1996]

§ 171.060 Watertight subdivision: General.

(a) Each of the following vessels must be shown by design calculations to comply with the requirements in §§ 171.065 through 171.068 for Type I subdivision or § 171.075 for Type III subdivision:

(1) Each vessel 100 gross tons or more on an international voyage: and

(2) Each vessel 150 gross tons or more in ocean service.

(b) Each vessel not described in paragraph (a) of this section must be shown by design calculations to comply with the requirements in §§ 171.070 to 171.073 for Type II subdivision.

(c) Except as allowed in § 171.070(c), each vessel must have a collision bulkhead.

(d) Each double-ended ferry that is required by paragraph (c) of this section to have a collision bulkhead must also have a second collision bulkhead. One collision bulkhead must be located in each end of the vessel.

§ 171.065 Subdivision requirements—Type I.

(a) Except as provided in paragraphs (c) and (f) of this section, the separation between main transverse watertight bulkheads on a vessel, other than one described in paragraph (b) of this section, must not exceed—

(floodable length)×(factor of subdivision)

where—

the factor of subdivision is listed under FS in Table 171.065(a).

(b) The factor of subdivision used to determine compliance with paragraph (a) of this section must be the smaller of 0.5 or the value determined from Table 171.065(a) if—

(1) The vessel is 430 feet (131 meters) or more in LBP; and

(2) The greater of the values of Y as determined by the following equations equals or exceeds the value of X in Table 171.065(b):

$$Y = \frac{(M + 2P)}{V}$$

or

$$Y = \frac{(M + 2P)}{V + P1 - P}$$

where—

M, V, and P have the same value as listed in Table 171.065(a); and
P1=the smaller of the following:
(i) 0.6LN (0.056LN) where—
N=the total number of passengers; and
L=LBP in feet (meters).
(ii) The greater of the following:
(A) 0.4LN (0.037LN).
(B) The sum of P and the total volume of passenger spaces above the margin line.

(c) The distance A in Figure 171.065 between main transverse watertight bulkheads may exceed the maximum allowed by paragraphs (a) or (b) of this section if each of the distances B and C between adjacent main transverse watertight bulkheads in Figure 171.065 does not exceed the smaller of the following:

(1) The floodable length.

(2) Twice the separation allowed by paragraphs (a) or (b) of this section.

(d) In each vessel 330 feet (100 meters) or more in LBP, one of the main transverse watertight bulkheads aft of the collision bulkhead must be located at a distance from the forward perpendicular that is not greater than the maximum separation allowed by paragraph (a) or (b) of this section.

(e) The minimum separation between two adjacent main transverse watertight bulkheads must be at least 10 feet (3.05 meters) plus 3 percent of the LBP of the vessel, or 35 feet (10.7 meters), whichever is less.

(f) The maximum separation of bulkheads allowed by paragraphs (a) or (b) of this section may be increased by the amount allowed in paragraph (g) of this section if—

(1) The space between two adjacent main transverse watertight bulkheads contains internal watertight volume; and

(2) After the assumed side damage specified in paragraph (h) of this section is applied, the internal watertight volume will not be flooded.

(g) For the purpose of paragraph (f) of this section, the allowable increase in separation is as follows:

$$\text{Increase in separation} = \frac{\text{"total volume of allowed local subdivision"}}{\text{"transverse sectional area at center of compartment"}}$$

where—

''total volume of allowed local subdivision'' is determined by calculating the unflooded volume on each side of the centerline and multiplying the smaller volume by two.

(h) The assumed extents of side damage are as follows:

(1) *The longitudinal extent of damage* must be assumed to extend over a length equal to the minimum spacing of bulkheads specified in paragraph (e) of this section.

(2) *The transverse extent of damage* must be assumed to penetrate a distance from the shell plating equal to one-fifth the maximum beam of the vessel and at right angles to the centerline at the level of the deepest subdivision load line.

(3) *The vertical extent of damage* must be assumed to extend vertically from the baseline to the margin line.

(i) The maximum separation between the following bulkheads must not exceed the maximum separation between main transverse watertight bulkheads:

(1) The collision bulkhead and the first main transverse watertight bulkhead aft of the collision bulkhead; and

(2) The last main transverse watertight bulkhead and the aftermost point on the bulkhead deck.

(j) The minimum separation between the following bulkheads must not be less than the minimum separation between main transverse watertight bulkheads:

(1) The collision bulkhead and the first main transverse watertight bulkhead aft of the collision bulkhead; and

(2) The last main transverse watertight bulkhead and the aftermost point on the bulkhead deck.

Figure 171.065

Combined Separation of Bulkheads

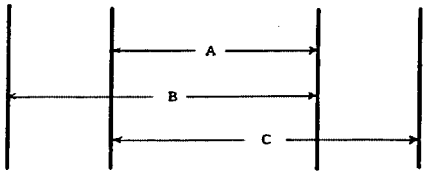

TABLE 171.065(a) (ENGLISH UNITS)

Vessel length (LBP)	Criterion numeral (CN)	FS
Vessel length greater than 392 feet.	CN less than or equal to 23.	A
	CN greater than 23 and less than 123.	F1
	CN greater than or equal to 123.	B
Vessel length greater than or equal to 200 feet and less than or equal to 392 feet.	CN less than or equal to S.	1
	CN greater than S and less than 123.	F2
	CN greater than or equal to 123.	B
Vessel length less than 200 feet.	.....	1

Where—

FS=the factor of subdivision.

$CN=60((M+2P)/V)+30000(N/L^2)$

$A=(190/(L-160))+0.18$

$B=(94/(L-85))+0.18$

$F1=A-((A-B)(CN-23)/100)$

$S=(10904-25L)/48$

$F2=1-((1-B)(CN-S)/(123-S))$

L=the length of the vessel (LBP) in feet.

M=the sum of the volume of the machinery space and the volumes of any fuel tanks which are located above the inner bottom forward or aft of the machinery space in cubic feet.

P=the volume of passenger spaces below the margin line.

V=the volume of the vessel below the margin line.

N=the number of passengers that the vessel is to be certificated to carry.

TABLE 171.065(a) (METRIC UNITS)

Vessel length (LBP)	Criterion numeral (CN)	FS
Vessel length greater than 120 meters.	CN lesthan or equal to 23	A
	CN greater than 23 and less than 123.	F1
	CN greater than or equal to 123.	B
Vessel length greater than or equal to 61 meters and less than or equal to 120 meters.	CN less than or equal to S.	1
	CN greater than S and less than 123.	F2
	CN greater than or equal to 123.	B
Vessel length less than 61 meters.	.....	1

Where—

FS=the factor of subdivision.
$CN=60((M+2P)/V)+2787(N/L^2)$
A=(58/(L–49))+0.18
B=(29/(L–26))+0.18
F1=A – ((A – B)(CN – 23)/100)
S=(3323.5 – 25L)/14.6
F2=1 – ((1 – B)(CN – S)/(123 – S))
L=the length of the vessel (LBP) in meters.
M=the sum of the volume of the machinery space and the volumes of any fuel tanks which are located above the inner bottom forward or aft of the machinery space in cubic meters.
P=the volume of passenger spaces below the margin line.
V=the volume of the vessel below the margin line.
N=the number of passengers that the vessel is to be certificated to carry.

TABLE 171.065(b)—TABLE OF X

Vessel LBP in feet (meters)	X[1]
430 (131)	1.336
440 (134)	1.285
450 (137)	1.230
460 (140)	1.174
470 (143)	1.117
480 (146)	1.060
490 (149)	1.002
500 (152)	0.944
510 (155)	0.885
520 (158)	0.826
530 (162)	0.766
540 (165)	0.706
550 (168)	0.645
554 (169) and up	0.625

[1] Interpolate for intermediate values.

§ 171.066 Calculation of permeability for Type I subdivision.

(a) Except as prescribed in paragraph (b) of this section, the following permeabilities must be used when doing the calculations required to demonstrate compliance with §171.065(a), (b), and (c):

(1) When doing calculations required to demonstrate compliance with §171.065(a) and (b), the uniform average permeability given by the formulas in Table 171.066 must be used.

(2) When doing calculations required to demonstrate that compartments on opposite sides of a main transverse watertight bulkhead that bounds the machinery space comply with §171.065(c), the mean of the uniform average permeabilities determined from Table 171.066 for the two compartments must be used.

(b) If an average permeability can be calculated that is less than that given by the formulas in Table 171.066, the lesser value may be substituted if approved by the Commanding Officer, Marine Safety Center. When determining this lesser value, the following permeabilities must be used:

(1) 95% for passenger, crew, and all other spaces that, in the full load condition, normally contain no cargo, stores, provisions, or mail.

(2) 60% for cargo, stores, provisions, or mail spaces.

(3) 85% for spaces containing machinery.

(4) Values approved by the Commanding Officer, Marine Safety Center for double bottoms, oil fuel, and other tanks.

(c) In the case of unusual arrangements, the Commanding Officer, Marine Safety Center may require a detailed calculation of average permeability for the portions of the vessel forward or aft of the machinery spaces. When doing these calculations, the permeabilities specified in paragraph (b) of this section must be used.

(d) When calculating permeability, the total volume of the 'tween deck spaces between two adjacent main transverse watertight bulkheads that contains any passenger or crew space must be regarded as passenger space volume, except that the volume of any space that is completely enclosed in steel buldheads and is not a crew or passenger space may be excluded.

TABLE 171.066—TABLE OF UNIFORM AVERAGE PERMEABILITIES

Location	Uniform average permeability
Machinery space	$85+\frac{10(a-c)}{v}$
Volume forward of machinery space	$63+\frac{35(a)}{\ }$